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<p>(21) International Application Number: PCT/IB99/00256 (22) International Filing Date: 15 February 1999 (15.02.99) (30) Priority Data: 09/062,364 17 April 1998 (17.04.98) US (71) Applicant: KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). (71) Applicant (for SE only): PHILIPS AB [SE/SE]; Kottbygatan 7, Kista, S-164 85 Stockholm (SE). (72) Inventors: CHOI, Sung, M.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). VAN EE, Jan; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). (74) Agent: FAESSEN, Louis, M., H.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).</p>		<p>(81) Designated States: CN, JP, KR, SG, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: GRAPHICAL USER INTERFACE TOUCH SCREEN WITH AN AUTO ZOOM FEATURE</p> <div data-bbox="354 1140 1276 1560"></div> <p>(57) Abstract</p> <p>A graphical user interface "touch screen" having an entire collection of icons displayed at a scale in which the individual function of each icon is recognizable, but too small to easily access features of the function, and wherein upon touching the screen area accommodating an area of the icon, the screen provides a zoomed in version of that area so that the user can select a desired feature.</p>		

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Graphical user interface touch screen with an auto zoom feature.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates in general to electronic devices having a relatively small display for providing a graphical user interface, and in particular to a hand-held electronic device having a graphical user interface ("GUI") and "touch screen" for accessing an entire collection of functions of the electronic device.

2. Description of the prior art

Icons are well known in the art of graphical user interfaces (GUI's) for controlling information processing systems. An icon is a small pictorial representation of some larger set of information. An icon provides information, in a condensed format, about the content or status of the underlying system. Icons are designed to trigger, through visual perception, operator concepts that communicate the content or operation of the system in a quick manner. The system then can be easily accessed or used through actuation of the icon.

An example of a controller unit for a home entertainment system is the Stage 3 Controller unit of Kenwood, described in Kenwood's publicly available manual "STAGE 3/ Setting up your KC-Z1 Controller", 1996. The control unit includes a hand-held controller with a touch screen functionality for the GUI. The GUI provides a large number of icons that correspond to a large number of system functionalities. The functionalities are activated through the icons on the touch screen. The GUI is user-programmable to select the icons that should be present in the main menu and those that should not. This is due to the relatively small amount of screen space available to the GUI.

Today's home entertainment systems have a large number of functions available to the user. The Kenwood uses a GUI to extend the number of functions that are available. The problem with GUI displays for hand-held devices, such as remote controls for consumer electronic devices, for personal digital assistants, and even for photocopiers is that they are relatively tiny. Adding the touch screen functionality to these displays means the displayed icons have to be large enough to be accessible by a person's fingers or if the icons are tiny, then they must be large enough so that some type of stylus can be used to "touch" the

icon. If larger icons are used the number of functionalities to be displayed diminishes. These drawbacks limit the use of touch screen displays on hand-held devices.

SUMMARY OF THE INVENTION

5 Accordingly, it is an object of the invention to provide a GUI touch screen display on a hand-held device that provides a maximum number of icons on the display yet the features of the icons are easily accessible by a user.

 This object is achieved by providing a zoom feature whereby a relatively small icon is provided on the GUI such that its functions are recognizable but not easily accessible by a user, but upon touch of the icon by a user the icon is made larger or magnified so that its functions can be accurately touched by a user's finger or stylus. Assuming the original icon is a picture of a keyboard, the icon in accordance with the invention is large enough to make the displayed keys "recognizable", but too small to allow individual keys to be conveniently accessed by the user. When the keyboard icon is touched by the user, in one embodiment of
15 the invention, the area of the icon that is touched, e.g. the keys surrounding the 'G' key, is magnified or zoomed in, such that this area fills the entire space that was provided for the original keyboard icon. Alternatively in another embodiment, when the keyboard icon is touched by the user, the entire icon becomes larger to basically fill the screen of the GUI or just the area touched becomes large enough to fill the screen of the GUI.

20 In yet another embodiment of the invention, the user can scroll across the keyboard such that new areas become magnified.

 The invention pertains to electronic devices having relatively small displays for providing touch screen GUI's and to hand-held electronic devices such as remote controls and personal digital assistants, PDA's. The devices include a display for displaying a GUI, and a
25 controller for enabling a user to control the system through a touch screen functionality of the GUI. The GUI provides a lay-out for each of the icons and the controller and GUI in conjunction provide a magnifying functionality that will zoom in on the icon to a magnification convenient for touch screen actuation.

 The invention accordingly comprises the several steps and the relation of one or
30 more of such steps with respect to each of the others, and the apparatus embodying features of construction, combinations of elements and arrangement of parts which are adapted to effect such steps, all as exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in further detail by way of example and with reference to the accompanying drawings, wherein:

Fig. 1a is a diagram of a PDA GUI touch screen showing a keyboard icon;

5 Fig. 1b is a diagram of the PDA of Fig. 1a after the user has touched the keyboard icon at approximately the letter 'H' location;

Fig. 1c is a diagram of the PDA of Fig. 1a wherein the zoomed in area of the icon fills the icon area only;

10 Fig. 2a is a diagram of a remote control device GUI touch screen keypad showing a keyboard icon;

Fig. 2b is a diagram of the remote control device in Fig. 2a when the vol ^ portion of the icon in Fig. 2a is touched; and

Fig. 3 shows the electronic device in accordance with the invention.

15 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Graphical user interfaces are well known in the art. U.S.P. 5,463,725, hereby incorporated by reference, is an example of a GUI with touch screen functionality.

20 Figs. 1a and 1b show a PDA 10 having a touch-screen GUI 13 in accordance with the invention. The keyboard icon 12 is displayed such that it is large enough to see its functionalities, but too small for convenient touch screen activation of a single key. If a user touches area 14 of the keyboard icon 12 the resulting display 16 is shown in Fig. 1b. As can be seen from this display 16 the individual keys surrounding area 14 are magnified and large enough for easy touch screen activation of a single key by a finger, such as the 'G' key 18 or any other nearby key. Upon releasing the 'G' key 18 the key is highlighted indicating its
25 activation and the GUI 13 then redisplay the original icon 12. Although Fig. 1b shows the actual size of the icon increasing, this is not a requirement of the invention. Alternatively, the icon can stay the same size but a feature of the icon will be magnified or zoomed in on as shown in Fig. 1c.

30 In another embodiment of the invention, when the icon 12 is touched at 14 and released and the features of the icon are magnified, the user can make a selection of a key or feature and upon release of the user's finger, after key selection, the icon does not automatically return the display 16 to the initial state 12, but instead the user can make another selection. After a predetermined time period has elapsed without a key selection being made, the icon returns to its original state 12.

In a further embodiment of the invention, the user can move across the entire keyboard by touching a particular edge of the magnified area causing magnification of the next area of the keyboard thus achieving a scrolling effect. In this embodiment of the invention, upon selection of a function or key of the icon, the icon will return to its original size, or again the icon could remain magnified until a predetermined time period elapses without a key being selected.

Fig. 2a shows a remote control for a consumer electronic device 20 having a touch-screen GUI 22. There are three icons displayed: the VCR icon 23, the DVD icon 24 and the TV icon 25. Each icon is too small to easily access the plurality of keys associated with the icon, however, the keys are recognizable. Upon touching one of the icons it will enlarge the area surrounding the point of touch 26 as shown in Fig. 2b or alternatively, if the display is large enough, all of the keys for a particular device may be accessible. The functionalities, such as scrolling 30, explained above with regard to the PDA can also be included in the remote control. In addition the icon itself can remain the same size but a feature of the icon will be zoomed in on.

Fig. 3 shows a block diagram of the GUI touch-screen display 30 and its associated controller 35 which permits touch-screen actuation of the GUI.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in carrying out the above method and in the construction set forth without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

CLAIMS:

1. A graphical user interface touch screen, for displaying controllable functions of an electronic device, comprising:
means for displaying (35,30,13) a function in the form of an icon (12) and at a scale size in which the function is recognizable by a user but too small to easily access features of the
5 function; and
means for providing (35,30) a magnified version (16) of at least an area of the icon upon the user touching the area of the icon.
2. A graphical user interface touch screen, in accordance with claim 1, further
10 including:
means for causing (35) the magnified version to scroll across the icon such that new areas of the icon are magnified.
3. A graphical user interface touch screen, in accordance with claim 1, further
15 including
means for restoring (35) the icon to the scale size after selection of a feature.
4. A graphical user interface touch screen, in accordance with claim 1, further
including
20 means for indicating (18,35) that a feature has been selected by the user.
5. A graphical user interface touch screen as claimed in claim 1, wherein the icon has a size of $n \times n$ and the magnified version is the same size.
- 25 6. A PDA, comprising:
a graphical user interface touch screen (13) for displaying functions of the PDA in the form of icons (12) at a scale size in which the function of an icon is recognizable but too small to easily access features of the function;

a controller (35) for providing a magnified version (16) of at least an area of an icon upon a user touching the area of the icon, such that the area of the icon becomes large enough for the user to easily select a feature of the function and thereby control the PDA.

5 7. A remote control for controlling a consumer electronics device, comprising:
a graphical user interface touch screen (22) which displays functions of the remote control
(20) in the form of icons (23,24,25) at a scale size in which the function of an icon is
recognizable but too small to easily access a feature of the function; and
a controller (35) which is capable of providing a magnified version of at least an area of the
10 icon upon (Fig. 2B) a user touching the area of the icon, such that the area of the icon becomes
large enough for the user to easily select a feature of the icon by touching the touch screen.

8. A remote control in accordance with claim 7, wherein at least one of the icons
(23,24,25) depicts a remote control device for a particular type of consumer electronic device.
15

9. A method of operating an electronic device, comprising:
displaying on a graphical user interface touch screen (13) a function of the electronic device in
the form of an icon (12) and at a scale size in which the function is recognizable by a user but
too small to easily access a feature of the function; and
20 providing a magnified version (16) of at least an area of the icon upon the user touching the
area of the icon such that the area of the icon becomes large enough for the user to easily
access features within the area of the icon by touching the touch screen.

10. An electronic device, comprising:
25 a controller (35); and
a graphical user interface with touch screen functionality (30) which, under control of the
controller, displays a set of user selectable options (12) and upon user activation of the touch
screen in a region comprising a subset of the options, the graphical user interface displays the
subset of the options at a magnified scale (16).

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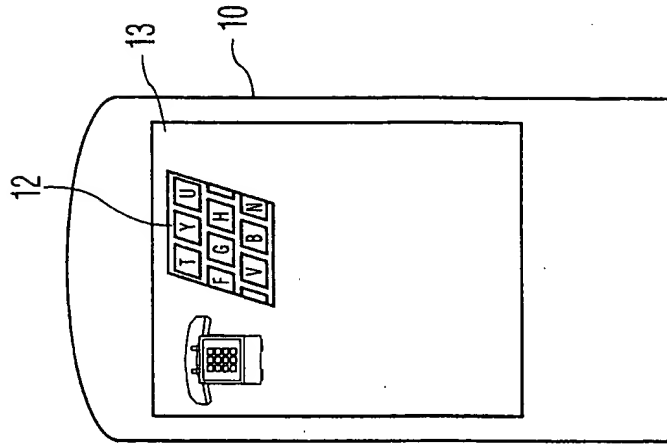


FIG. 1A

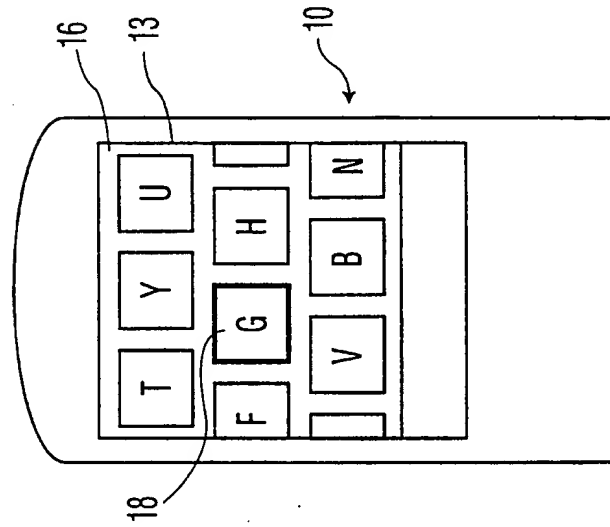


FIG. 1B

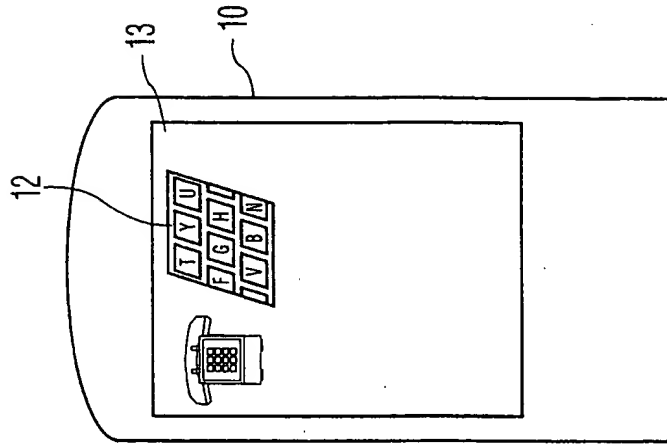


FIG. 1C

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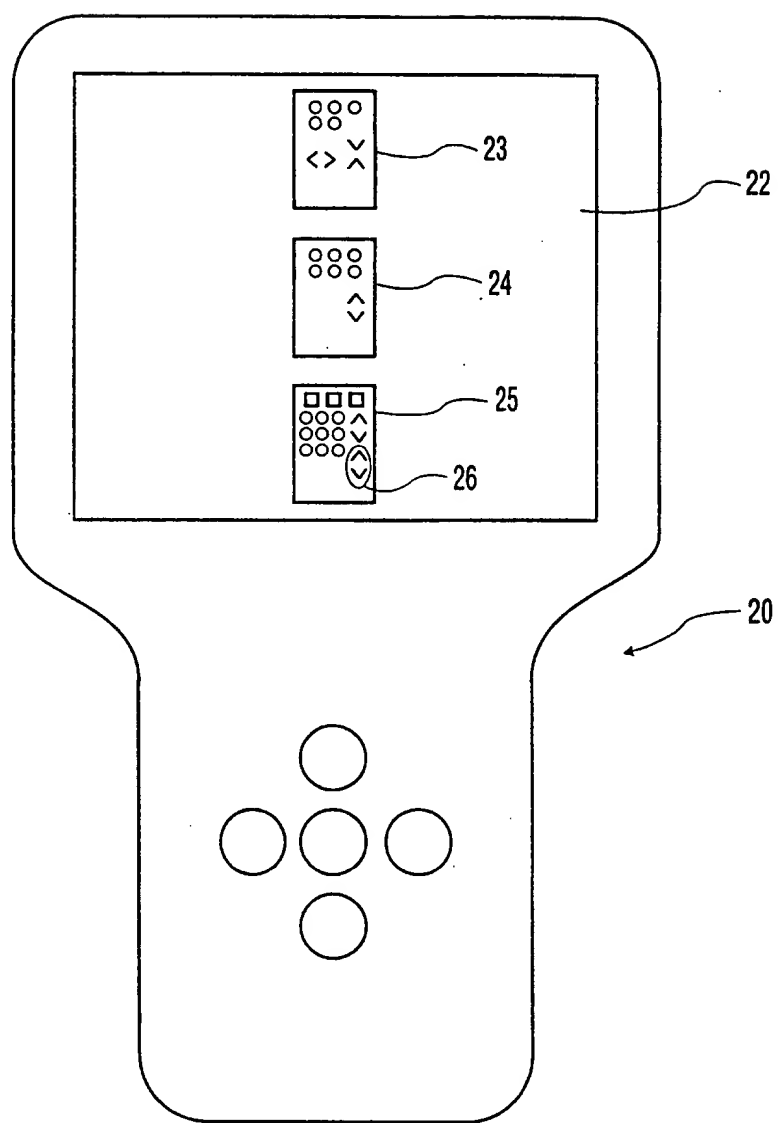


FIG. 2A

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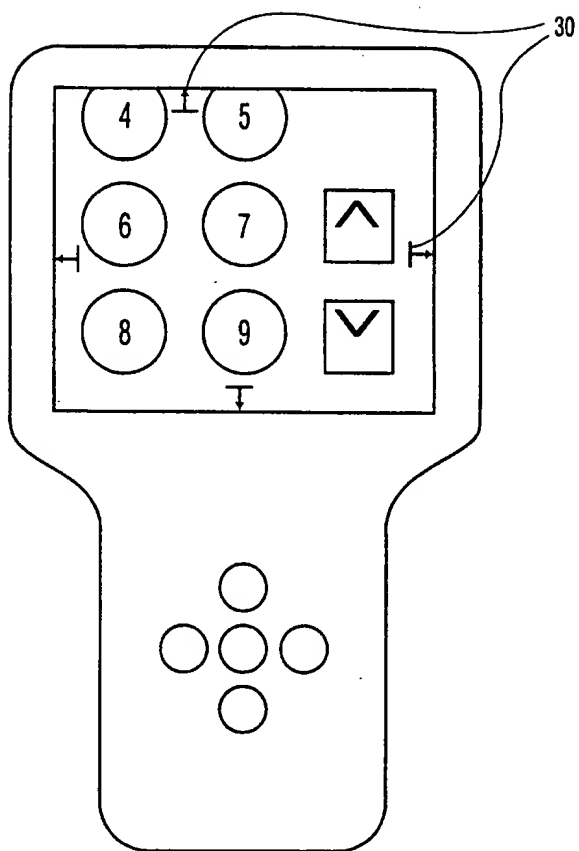


FIG. 2B

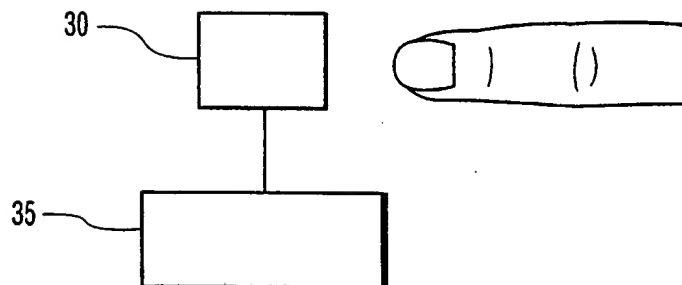


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 99/00256

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G06F 3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0542660 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION), 19 May 1993 (19.05.93) ----- -----	1-10

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